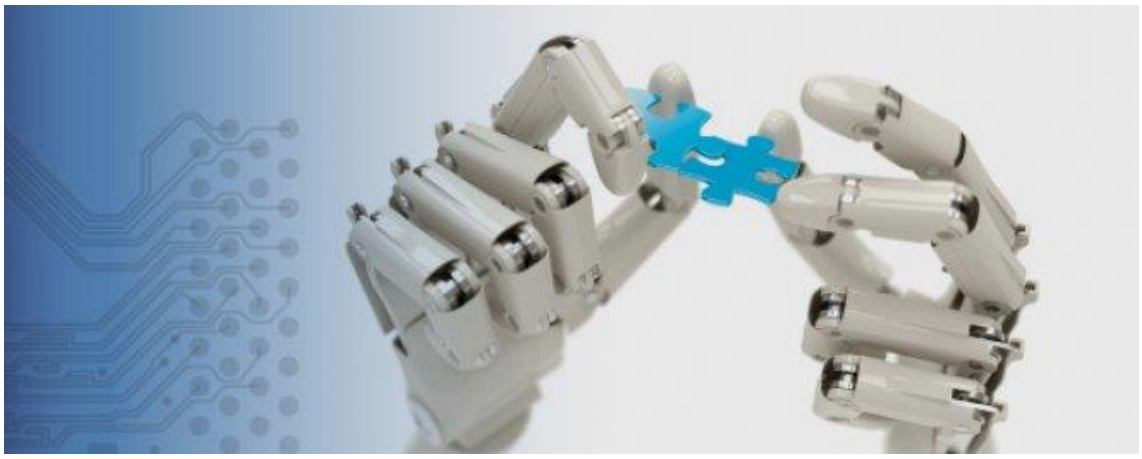
ROBOTICS MASTER

Universitat de Vic



Subject: Perception Systems

Session1: Sensors and Measurements

Exercixse 1.1: Encoder pulses

Author: Toni Guasch Serra

Date: 2015-10-27

Exercise 1.1.
If you have a mobile robot with wheels of radius R=0.4m, and it can run at maximum speed of 3m/s, compute how many pulses will receive a counter if you use an encoder of 500ppr.

Exercise 1.1.

If you have a mobile robot with wheels of radius R=0.4m, and it can run at maximum speed of 3m/s, compute how many pulses will receive a counter if you use an encoder of 500ppr.

Using angular velocity formula;

$$w\left[\frac{rad}{s}\right] = \frac{V[\frac{m}{s}]}{R[m]} = \frac{3\ m/s}{0.4\ m} = 7.5\ rad/s$$

Considering that 1 r.p.m. is equal to;

$$1rpm = \frac{2\pi[rad]}{60[s]} = \frac{\pi}{30}[\frac{rad}{s}]$$

Applying a simple rule of three can be obtained the number of revolutions per minute;

$$1 \rightarrow \frac{\pi}{30}$$
$$x \rightarrow 7.5$$
$$x\frac{7.5}{\frac{\pi}{30}} = 71.61\ rpm$$

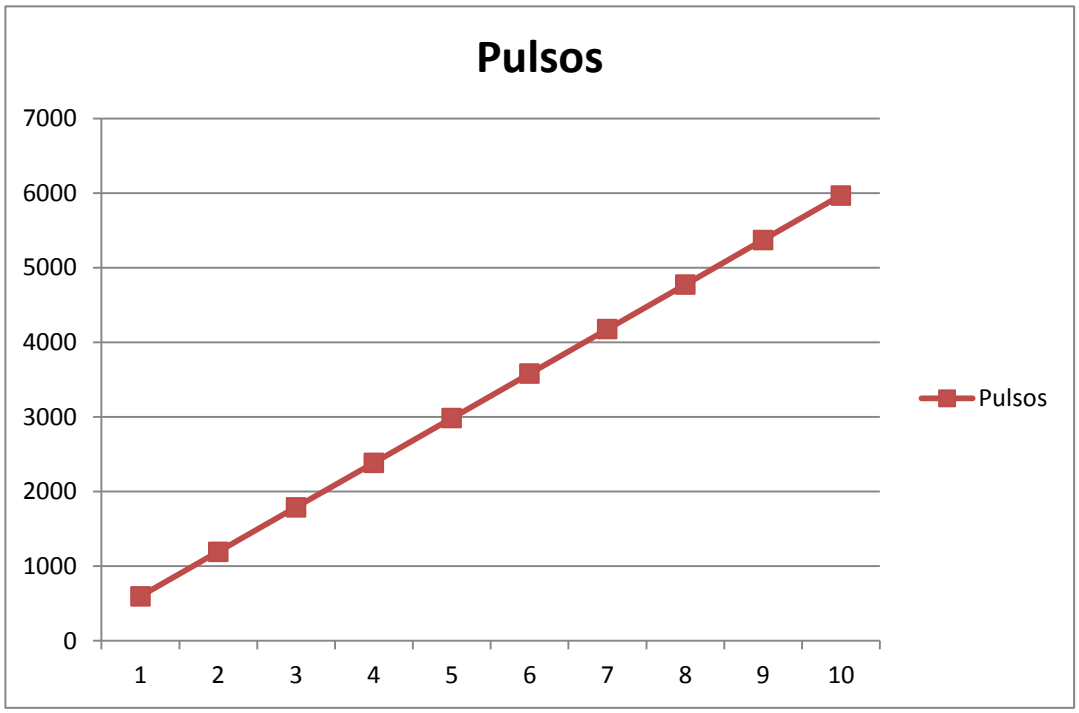
To know the revolutions per second;

$$\frac{71.61}{60}$$

Considering that the encoder gives 500 pulses per revolution in one second. The number of pulses received by the counter;

$$\frac{71.61}{60} * 500 = \mathbf{596.75\ Pulses}$$

Radius	**0,4m**
Speed	**3m/s**
Encoder ppr	**500**
Time [s]	**Pulses**
1	596,75
2	1193,5
3	1790,25
4	2387
5	2983,75
6	3580,5
7	4177,25
8	4774
9	5370,75
10	5967,5


Pulsos
7000
6000
5000
4000
3000
2000
1000
0
1
2
3
4
5
6
7
8
9
10
Pulsos